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PD-03W124

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	)	
Mary Morabito O'Neill et al.	)	GAU: 2878
Ser. No. 10/790,889	)	Examiner:
Filed: March 1, 2004	)	Kevin S. Wyatt
For: IMAGING SENSOR SYSTEM WITH STAGGERED ARRANGEMENT OF IMAGING DETECTOR SUBELEMENTS, AND METHOD FOR LOCATING A POSITION OF A FEATURE IN A SCENE	)	

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant files its Appeal Brief, together with a Fee Transmittal authorizing the charging of the required fee. A Notice of Appeal and fee were previously filed.

Real party in interest

The real party in interest is the assignee, Raytheon Co.

Related appeals and interferences

Applicant is not aware of any related appeals and/or interferences.

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Status of claims

Claims 1-20 were filed.

During prosecution, claims 13 and 16 were amended, and new claim 21 was added.

In the Office Action of December 4, 2006 ("Office Action" hereinafter), claims 1-5, 11-15, and 17-21 were rejected for a second time, and claims 6-10 and 16 were objected to.

The rejection of claims 1-5, 11-15, and 17-21 is appealed. These claims are set forth in Appendix I.

Status of amendments

A Response to Office Action was filed, but it had no claim amendments.

Summary of claimed subject matter

There are three independent claims 1, 13, and 17. There are no means claims.

The imaging sensor system of claim 1 is illustrated in Figures 1-3, and discussed in detail at page 6, line 10-page 14, line 19. The concept of blur-circle image is illustrated in Figure 5.

Claim 1 recites an imaging sensor system (20) comprising an optics system (22) that images a point feature of a scene at an image plane (24) as a blur-circle image (84) having a blur diameter, and a detector array (28) at the image plane (24). The detector array (28) is a one-dimensional detector array (28) comprising a plurality of detector subelements (42) each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters. Each detector subelement (42) overlaps each of two adjacent detector subelements (42) along their lengths. An overlap of each of the two adjacent detector subelements (42) is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements (42) is n_0 blur diameters. The value

of n is equal to about 3m, and m is equal to about $n_o/2$.

The imaging sensor system of claim 13 is illustrated in Figures 1-3, and discussed in detail at page 6, line 10-page 14, line 19. The concept of blur-circle image (84) is illustrated in Figure 5.

Claim 13 recites an imaging sensor system (20) comprising an optics system (22) that images a point feature of a scene at an image plane (24) as a blur-circle image (84) having a blur diameter, and a detector array (28) at the image plane (24). The detector array (28) is a one-dimensional detector array (28) or a two-dimensional detector array (28) comprising a plurality of detector subelements (42), and the detector subelements (42) are sized responsive to the blur diameter.

The steps of method claim 17 are illustrated in Figure 17 and the physical elements are illustrated in Figures 1-3, and discussed at in detail at page 6, line 10-page 14, line 19. The physical elements are illustrated in Figures 1-3, and the concept of blur-circle image is illustrated in Figure 5.

Claim 17 recites a method for locating a position of a feature in a scene, comprising the steps of forming (step 120) an image of the feature using a segmented array having a plurality of array subelements (42), wherein each of the array subelements (42) has an output signal (44), and cooperatively analyzing (step 122) the output signals (44) from at least two spatially adjacent array subelements (42) to establish a data set reflective of an extent to which output signals (44) responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements (42), and to reach a conclusion from the data set as to a location of the image of the feature on the segmented array.

Grounds of rejection to be reviewed on appeal

Ground 1. Claims 17-21 are rejected under 35 USC 102 as anticipated by Hou US patent 6,596,979.

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Ground 2. Claims 1-4 and 11-15 are rejected under 35 USC 103 over Hou '979 in view of Coufal US Pub. 2003/0053221.

Ground 3. Claims 1-5 are rejected under 35 USC 103 over Carnall US Patent 5,065,245 in view of Hou '979 and further in view of Coufal US Pub. '221.

Argument

Background of the Invention, and the Invention

This section provides a further understanding of the present invention in relation to the problems that it solves.

One form of an imaging sensor system can include optics (i.e., lenses, mirrors) and a detector array formed of a plurality of discrete detector subelements. In the limit of resolution of such a detector array, the detector array seeks to identify the exact location of a point feature in a scene from the detector subelement that has the greatest image intensity for that point feature. (Specification, para. [0002]-[0005]).

To increase the spatial resolution of the detector array, the detector subelements may be made smaller. However, "edge effects" play an increasingly great rôle as the size of the detector subelements decreases, because the point feature when projected on the detector may be broadened to overlie more than one detector subelement. As a result, a point feature of the scene may be imaged by two different detector subelements, leading to uncertainty as to the location of the point feature. (Specification, para. [0005]).

An important aspect of the present invention is the recognition by the present inventors that the analysis of the spatial resolution of features from the output signals of the detector array is related to such edge effects. Method claims 17-20 recite a technique by which the determination of spatial resolution is improved by cooperatively analyzing adjacent array subelements based upon whether the output signals come from exactly one or from more than one adjacent detector subelement, i.e., the presence of,

and nature of, the overlying of the detector subelements. (Specification para. [0014], [0058]-[0061]).

None of the prior art discusses cooperatively analyzing the output signals from at least two spatially adjacent array subelements to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements. None of the prior art discusses reaching a conclusion from the data set as to a location of the image of the feature on the segmented array".

Another consideration in improving spatial resolution is the interrelation of the optical performance of the optics system and the size and position of the detector subelements. Specifically, most analyses of detector subelements assume that the optics system is perfect, and that a point feature of a scene is imaged by the optics system onto the detector subelements as a point. Practically, however, and as recognized by the present inventors, optics systems composed of lenses and mirrors are not perfect, and a point feature of a scene is imaged not as a point but as a circle termed a "blur circle" having a blur diameter. The blurring of a point in the scene is a result of physical effects in the optics system such as various types of aberrations and diffraction. (Specification, para. [0034]).

The present apparatus claims 1-16 are based upon the inventors' recognition that improved resolution performance of the imaging sensor system is achieved by accepting the fact of the blurring of the image by the optical system portion of the imaging sensor system, and designing the detector subelements of the detector array responsive to the "blur circle" performance of the optical system. Stated otherwise, when an image of a point feature of a scene is blurred by the optics system before it reaches the detector array subelements, there is an increased tendency for positional uncertainty due to the edge effects at the edges of the detector subelements. Making the detector subelements smaller and smaller does not solve the problem, because of the edge effects. (Specification, para. [0034]).

The present approach as recited in claims 1-16 provides a solution by sizing and dimensioning the detector subelements responsive to the performance of the optical

system as expressed by the "blur diameter" of the optical system.

None of the applied prior art mentions "blur circle" or "blur diameter" or any comparable feature of the optical system. None of the applied prior art suggests the performance of the optical system in the form of the blur diameter should be taken into account in designing the dimensions and layout of the detector subelements. And there is certainly nothing in any of the references setting forth the specific design parameters such as recited in claim 1 and its dependent claims.

Applicant now turns to the specific rejections.

Ground 1. Claims 17-21 are rejected under 35 USC 102 as anticipated by Hou US patent 6,596,979.

The following principle of law applies to sec. 102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under section 102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.' Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985)

Thus, identifying a single element of the claim which is not disclosed in the reference is sufficient to overcome a Sec. 102 rejection.

The explanation of the rejection (Office Action, page 2, lines 13-22) focuses on the embodiments of Figures 2-3 and Figure 10 of Hou, discussed at col. 9, line 52 et seq., as well as col. 5, lines 27-57 of Hou Applicant will direct the remarks primarily to these embodiments and portions of Hou as well.

Claims 17, 19

Claim 17 recites in part:

"cooperatively analyzing the output signals from at least two spatially adjacent array subelements

to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and

to reach a conclusion from the data set as to a location of the image of the feature on the segmented array."

The explanation of the rejection (last full paragraph on page 2 of the Office Action) suggests that this limitation is disclosed in relation to Figures 2A-2B, 3, and 10, and at col. 5 lines 27-35; col. 5, lines 48-57; and col. 5, lines 57-60 of Hou. Applicant respectfully disagrees. Col. 5, lines 27-35 discloses the formation of the signal. Col. 5, lines 48-57 discloses the integration of the data. Col. 5, lines 57-60 discloses the readout of the image. The Figures are in support of these disclosures.

Nowhere in this discussion, or elsewhere in Hou, is there any mention of the terms or the concept of "produced from exactly one or from more than one" as recited in claim 17.

The hardware structure illustrated in Figures 2A-2B and 3 of Hou has no physical capability for determining whether an output signal responsive to the image is produced from exactly one or from more than one adjacent array subelement. The discussion of the logic at col. 5, lines 48-60 discloses sampling each photodetector individually. There is no mention of any further sampling device or logic for determining whether exactly one or more than one of the adjacent photodetectors is producing an output signal This portion of Hou discloses only the accumulation of signal data, but does not suggest that there should be a cooperative analysis of "a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array

subelements".

The explanation of the rejection quotes the present claim language, but does not identify what specific language in the referenced portion of Hou leads the Examiner to conclude that any logic of Hou would "establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements". Perhaps the Examiner will give some detail in the Examiner's Answer, as to exactly what language in Hou is said to support the explanation of the rejection.

There is nothing in the referenced text or drawings stating that Hou somehow analyzes its data to decide that output signals come from one or from more than one of the adjacent array subelements. The Figures 2A-2B disclose the sensing structure and logic of Hou, but not any analyzing of the sensed data. Figure 3 depicts the hardware layout of sensor elements and the gathering of data, but again with no illustration of data analysis. Figure 10 shows a staggered two-dimensional array of sensor elements. A reading of col. 5 lines 27-35; col. 5, lines 48-57; and col. 5, lines 57-60 of Hou does not reveal any discussion of "cooperatively analyzing the output signals from at least two spatially adjacent array subelements to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements".

The explanation of the rejection focuses on one specific portion from Hou as disclosing the "cooperatively analyzing" limitation: col. 5, lines 48-57 (see Office Action, 4-8 lines from bottom of page 2). Applicant quotes col. 5, lines 48-57 in its entirety:

> "Fig. 3 illustrates an exemplary layout of sensor elements with associated image signal processing electronics 300. Photodetector array 302 comprises a single row of N photodetectors and each is labeled #1, #2,....#N. During a scanning operation, each of the photodetectors collects image lights cast thereon for an integration period and generates an electronic signal. At the end of the integration period, the electronic signals are amplified in an amplifier array 304 and sampled respectively

via a sampling circuit array 306."

This passage describes the standard collecting of data from each photodetector for an integration period, and the resulting integrated signal for each detector is sampled and multiplexed into an amplifier. This is a description of the early stage of data gathering. Any logic applied to the signals comes downstream from that point. This portion of Hou is unrelated to the quoted language of claim 17.

Applicant also carefully studied the Response to Argument of the present Office Action, hoping to find this point, discussed at length in the Remarks of the prior Response to Office Action, addressed. It was not.

Claim 18

Claim 18 depends from claim 17 and incorporates its limitations. The limitations of claim 17 are not disclosed by Hou for the reasons stated above and which are incorporated here. Claim 17 is not anticipated by Hou, and claim 18 therefore also cannot be anticipated by Hou.

Additionally, claim 18 recites in part:

"the step of providing a sensor includes the step of
providing a one-dimensional segmented array having spatially overlapping array subelements."

The explanation of the rejection (paragraph bridging pages 2-3 of the Office Action) references Figure 10 of Hou, which clearly shows a two-dimensional segmented array, not a one-dimensional segmented array.

Claim 20

Claim 20 depends from claim 17 and incorporates its limitations. The limitations of claim 17 are not disclosed by Hou for the reasons stated above and which

are incorporated here. Claim 17 is not anticipated by Hou, and claim 20 therefore also cannot be anticipated by Hou.

Claim 20 additionally recites in part:

> "...the step of forming an image includes the step of forming the image having a diameter of one blur diameter"

Hou has no such disclosure, because Hou does not disclose blur diameters and because Hou does not disclose forming an image having a diameter of one blur diameter.

The Office Action argues that the limitations of claim 20 are found in Figures 9A-9B and at col. 9, lines 21-24 of Hou. There is no mention of blur diameters or one blur diameter at these locations or elsewhere in Hou. The terms "blur" and "blur diameter" do not appear at all in Hou, nor is there any suggestion of the concept of blur diameter as related to the performance of the optics system.

Elsewhere, the explanations of the rejections seek to analogize the "scanning dot" of Hou (col. 10, lines 3-18) to the "blur circle" and "blur diameter" recited in the present claims. There is no factual basis for that assumption. In fact, the "scanning dot" of Hou is not the "blur circle" recited in the present claims. Hou is concerned with optical flatbed scanners such as used to scan the printed matter of a document for input into a computer (col. 1, lines 14-35). The "scanning dot" of Hou is the light spot that is scanned across the printed matter. The scanning dot is not a "blur circle", which is the image of a point feature of a scene at an image plane.

<u>Claim 21</u>

Claim 21 depends from claim 17 and incorporates its limitations. The limitations of claim 17 are not disclosed by Hou for the reasons stated above and which are incorporated here. Claim 17 is not anticipated by Hou, and claim 21 therefore also cannot be anticipated by Hou.

Claim 21 further recites in part:

"each detector subelement overlaps each of two adjacent detector subelements along their lengths by an amount that is responsive to the blur diameter"

The Office Action argues that the limitations of claim 21 are found in Figure 10 of Hou. There is no mention of blur diameters or one blur diameter at this location or elsewhere in Hou. The terms "blur" and "blur diameter" do not appear at all in Hou, nor do the concepts of the spreading of a point feature of a scene due to the performance of the optics system.

Ground 2. Claims 1-4 and 11-15 are rejected under 35 USC 103 over Hou '979 in view of Coufal US Pub. 2003/0053221.

MPEP 2142, under ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS, provides: "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]. See MPEP para 2143-2143.03 for decisions pertinent to each of these criteria."

First requirement--there must be an objective
basis for combining the teachings of the references

The <u>first of the requirements of MPEP 2142</u> is that "there must be some suggestion or motivation, either in the references themselves or in the knowledge

generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings". The present rejection is a sec. 103 combination rejection. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2142, 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

> "The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

> "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

> "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

* * * * *

"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

* * * * *

"A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure.

Hou and Coufal deal with entirely different things. Hou teaches photodetectors upon which a scene is imaged. In the specific case of most interest to Hou, the scene is a paper-based object, such as text and graphics, that is to be imaged in a flat-bed scanner or the like. (See for example col. 1, lines 22-25 and col. 2, lines 57-59.) Coufal deals with an entirely different subject, the tailoring of the transverse intensity distribution of a beam of light produced by a laser or other collimated light source having a Gaussian transverse intensity distribution. (See, for example, para. [0003]-

[0011], [0014]-[0017], and claim 1) There is absolutely no reason to believe that light from a scene, such as imaged by Hou, is in the form of a beam having a Gaussian intensity distribution such as discussed by Coufal. Of course, it is not in such a form, being ordinary visible light.

Further, in this case, the stated premise for the combination (Office Action, page 5, lines 2-5) is factually incorrect. The premise is that "Coufal discloses...blur-circle image having a blur diameter based on its optics system (paragraph 0089, lines 1-4)." There is no mention of blur-circle image or blur-circle diameter at this location or elsewhere in Coufal, nor is there any mention of the concept of the spreading of a point in a scene by the optics system. The word "blur" does not appear in Coufal. Further, as noted in the prior paragraph, the teaching of Coufal for tailoring the transverse intensity distribution of a light beam from a laser has nothing to do with the photodetector of Hou.

There is no basis for combining the teachings of these two references.

Second requirement--there must be
an expectation of success

The <u>second of the requirements of MPEP 2142</u> is an expectation of success. There is no expectation of success...This requirement has not been addressed in the explanation of the rejection, and in any event more than Examiner's argument is required here. Applicant will be interested to consider the argument for success in light of the completely different purposes of the technologies of Hou and Coufal.

As stated in MPEP 2142, "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. [citations omitted]."

Third requirement--the prior art must teach the claim limitations

The third of the requirements of MPEP 2142 is that "the prior art reference (or references when combined) must teach or suggest all the claim limitations." In this regard, the following principle of law applies to all sec. 103 rejections. MPEP 2143.03 provides "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

The explanation of the rejection (long paragraph bridging pages 4-5 of the Office Action) focuses on the embodiments of Figures 2-3 and Figure 10 of Hou, discussed at col. 9, line 52 et seq. Applicant will direct the remarks primarily to these embodiments as well.

Claims 1, 11, 12

Claim 1 recites in part:

> "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter"

The explanation of the rejection seeks to analogize the "scanning dot" of Hou with the recited "blur circle". There is no factual basis for that attempted analogy, and nothing in Hou supports the Examiner's argument on this point. In fact the "scanning dot" of Hou is not the "blur circle" recited in the present claims. Hou is concerned with

optical flatbed scanners such as used to scan the printed matter of a document for input into a computer or for photocopying (col. 1, lines 14-35). The "scanning dot" of Hou is the light spot that is scanned across the printed matter. The scanning dot is not a "blur circle", which is the image of a point feature of a scene at an image plane.

The explanation of the rejection of claim 1 spanning pages 4-5 of the Office Action has a long discussion of what Hou is said to teach in terms of blur diameters. In the midst of this discussion, at 2-3 lines from the bottom of page 4, the explanation states "Hou does not explicitly disclose that the optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter." In point of fact, Hou does not explicitly or implicitly disclose or teach anything about blur diameters or the concept of blur diameters, or the concept of the spreading of a point in a scene by the optics system of an imaging sensor system. The discussion at col. 10, lines 12-18 is not related to blur diameter, but simply a statement of the size of the scanning dot.

The long discussion prior to this point of the explanation of the rejection is nothing but a paraphrasing of the recitation of claim 1. It is unrelated to anything that is taught by Hou. There is no disclosure in Hou of "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter". Hou has no teaching of any of this argued material found at page 4, lines 4-19 of the Office Action.

Claim 1 further recites in part:

> "...the detector array is a one-dimensional detector array comprising a plurality of detector subelements each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters,..."

The detector array disclosed in Figure 10 and discussed at col. 9, lines 52 et seq. is a two-dimensional detector array, not a one-dimensional detector array as recited in claim 1.

The explanation of the rejection asserts that this limitation is disclosed at col. 10, lines 12-18 of Hou. There is no such disclosure at this location or any other location

of Hou. There is not even a remote suggestion of such a limitation at col. 10, lines 12-18 or elsewhere in Hou. This portion of Hou says nothing about the dimensions of detector elements relative to the diameters of the scanning dots 960, 968, and 970 or relative to blur diameters. Col. 10, lines 12-18 of Hou observes that when one of the circles overlaps three photodetectors in Figure 10, it overlaps three photodetectors so that each of the three photodetectors generates an output signal.

Further, Hou makes it very clear that there is no attempt to describe or illustrate the scanning dots 960, 968, 970 as having any particular size or dimensions relative to the detector sizes. Hou states that "It should be noted that scanning dot 960, 968, and 970 are for illustration only" (col. 10, lines 13-18). This statement must be read in conjunction with Hou's disclosure that "the arrangement of rows of photodetectors is made in such manner that at any exposure, three colored photodetectors will be exposed." (col. 9, line 67-col. 10, line 2) As long as the scanning dot overlies three colored photodetectors at some point, Hou's disclosure is met.

The Office Action argues that the structure shown in Figure 10 is a one-dimensional array. No, it really is not. Figure 10 is a two-dimensional array of three different types of detectors R (red), B (blue), and G (green).

In short, Hou presents no concept of the size of photodetectors in relation to a blurred point image. The reading of Hou in the explanation of the rejection is made only in light of the present disclosure, which takes a much more sophisticated approach to the designing of photodetector dimensions in relation to the blurred image produced by the optics system.

Claim 1 further recites in part:

> "wherein an overlap of each of the two adjacent detector subelements is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements is n_0 blur diameters, wherein n is equal to about 3m and m is equal to about $n_0/2$."

Although the explanation of the rejection argues at page 3, lines 5-11 that this limitation is somehow disclosed in Hou, there is no such disclosure for several reasons.

First, Hou does not disclose a blur diameter (or any comparable concept) at all, in any context. Second, Hou discusses the overlap of adjacent photodetectors in terms of the size of the photodetector, not in terms of blur diameters. Third, Hou has no mention of the spacing of adjacent detector subelements in terms of blur diameters.

The paragraph bridging pages 10-11 of the Office Action references col. 9, lines 59-61. This portion of Hou says that each row of the staggered two-dimensional array of Hou shown in Figure 10 is staggered by 1/2 of the detector size. This has no relation to a blur diameter of a point image on the detector, but instead is related only to the detector dimension.

Coufal is relied upon for a teaching "that the optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter based on its optics system (paragraph 0089, lines 1-4)." That is not a correct statement of what Coufal teaches, either at paragraph [0089], lines 1-4, or elsewhere. Nor is Coufal's teaching properly combined with that of Hou for the reasons stated earlier, unless the Examiner can show that the scene imaged by Hou is a beam with a Gaussian transverse intensity distribution. Any attempt to import teachings from Coufal into Hou is baseless otherwise.

Claim 2

Claim 2 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 2 therefore also cannot be taught by the combination of references.

Claim 2 further recites in part:

"the detector subelements each have a width of about 1 blur diameter."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion

of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, neither reference has a teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 5 of the Office Action), it is argued "1 blur diameter corresponds to the area of a single detector to approximately 1/2 the area of 3 adjacent detectors according to col. 10, lines 12-18". There is no basis for this statement at col. 10, lines 12-18 or elsewhere. This portion of Hou references Figure 10, where the scanning dots are clearly shown not to have the relationships postulated in the explanation of the rejection.

Claim 3

Claim 3 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 3 therefore also cannot be taught by the combination of references.

Claim 3 further recites in part:

> "n lies in a range of from about (3m-2) to about (3m+2), and m lies in a range of from about (n_o/2-1) to about (n_o/2+1)."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, neither reference has any teaching of the quoted claim limitation.

The explanation of the rejection (Office Action, page 5, second full paragraph) states: "Hou further discloses that n lies in a range of from about (3m - 2) to about (3m + 2), and m lies in a range of from about (n_o/2 - 1) to from (n_o/2 + 1)". No location of this "disclosure" is given. Come on. Hou has nothing like this at all. As with the other rejections, the Examiner has just quoted the language of the claim and stated, without basis, that such a teaching is found in the reference. This instance just highlights the baselessness of this mode of assertion because it is such a specific mathematical recitation.

Claim 4

Claim 4 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 4 therefore also cannot be taught by the combination of references.

Claim 4 further recites in part:

> "n lies in a range from (3m-2) to (3m+2), and m lies in a range of from (n_O/2-1) to (n_O/2+1)."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, neither reference has any teaching of the quoted claim limitation.

The explanation of the rejection (Office Action, page 5, third full paragraph) states: "Hou further discloses that n lies in a range of from (3m - 2) to (3m + 2), and m lies in a range of from (n_o/2 - 1) to (n_o/2 + 1)". No location of this "disclosure" is given.

Come on. Hou has nothing like this at all. As with the other rejections, the Examiner has just quoted the language of the claim and stated, without basis, that such a teaching is found in the reference. This instance highlights the baselessness of this mode of assertion because it is such a specific mathematical recitation.

Claims 13-15

Claim 13 recites in part:

> "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter"

The explanation of the rejection seeks to analogize the "scanning dot" of Hou with the recited "blur circle". There is no factual basis for that attempted analogy, and nothing in Hou supports the Examiner's argument on this point. In fact the "scanning dot" of Hou is not the "blur circle" recited in the present claims. Hou is concerned with optical flatbed scanners such as used to scan the printed matter of a document for input into a computer (col. 1, lines 14-35). The "scanning dot" of Hou is the light spot that is scanned across the printed matter. The scanning dot is not a "blur circle", which is the image of a point feature of a scene at an image plane.

The explanation of the rejection of claim 13 at page 6 of the Office Action has a long discussion of what Hou is said to teach in terms of blur diameters. In the midst of this discussion, at page 6, lines 8-10, the explanation states "Hou does not explicitly disclose that the optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter." In point of fact, Hou does not explicitly or implicitly disclose anything about blur diameters or the concept of blur diameters. The discussion at col. 10, lines 12-18 is not related to blur diameter, but simply a statement of the size of the scanning dot.

Accordingly, the long discussion prior to this point of the explanation of the rejection is nothing but a paraphrasing of the recitation of claim 1. It is unrelated to anything that is taught by Hou. There is no disclosure in Hou of "an optics system that

images a point feature of a scene at an image plane as a blur-circle image having a blur diameter". Hou has no teaching of any of this argued material found at page 4, lines 4-19 of the Office Action.

Claim 13 further recites in part:

"...detector subelements are sized responsive to the blur diameter..."

Hou does not disclose a blur diameter, and certainly does not disclose or suggest that the photodetectors are sized in any manner responsive to a blur diameter. The sizing of detector subelements functionally responsive to the blur diameter is a concept originated in the present application.

Ground 3. Claims 1-5 are rejected under 35 USC 103 over Carnall US Patent 5,065,245 in view of Hou '979 and further in view of Coufal US Pub. '221.

Applicant incorporates from the discussion of Ground 2 the legal requirements for a sec. 103 rejection.

First requirement--there must be an objective
basis for combining the teachings of the references

In this case, the teachings of Hou cannot be combined with those of Carnall due to the different geometries and analytical procedures taught by the two references.

At the bottom of page 7 of the Office Action, it is argued that combining the teachings of these two references would "provide a reliable means of focusing and aligning image onto the photodetector array". No location is referenced for this assertion, and Applicant cannot find any such assertion in Hou. Further, there is no reason to believe that Carnall needs such a means, or that the approach of Hou would provide such a feature to Carnall's structure.

Further, there is no basis for adding in the teachings of Coufal. Applicant incorporates the discussion of the different technologies of Hou and Coufal from the Ground 2 discussion. This point applies here as well, and to the attempt to combine teachings of Coufal with those of Carnall. Carnall also deals with a sensor, not the tailoring of the transverse intensity of a Gaussian-distribution laser beam as in Coufal.

Second requirement--there must be
an expectation of success

This requirement is not addressed in the explanation of the rejection. Applicant incorporates its prior discussion of this requirement.

Third requirement--the prior art
must teach the claim limitations

Claim 1

Claim 1 recites in part:

> "an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter;"

Neither reference teaches or even mentions "blur-circle image" or "blur diameter" or the concept of the blurring of a point of light in the scene after passing through the optics at all, in any way.

At page 8, lines 8-9, the explanation of the rejection states: "Carnall, Jr. does not disclose an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter. Hou shows in Fig. 2B a) an optics system (208, optical lens 274) that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter (col. 5, lines 27-33)." Hou has no such

disclosure or teaching at col. 5, lines 27-33 or elsewhere. There is no mention of blur circle image or any analogous concept in Hou.

Claim 1 further recites in part:

> "the detector array is a one-dimensional detector array comprising a plurality of detector subelements each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters,"

None of the references teach these limitations. The explanation of the rejection asserts that Carnall teaches these limitations, but points to no location in the reference as a source of the teachings.

Claim 1 further recites in part:

> "wherein an overlap of each of the two adjacent detector subelements is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements is n_0 blur diameters, and
> wherein n is equal to about 3m and m is equal to about $n_0/2$."

Neither reference teaches these limitations. The explanation of the rejection asserts that Carnall teaches these limitations, but points to no location in the reference as a source of the teachings.

In the first paragraph bridging page 8 of the Office Action, its the same thing. Quotations from the present claims instead of a discussion of what Carnall teaches, without any sources in Carnall. None of the references teach the limitations of claims 2-5.

<u>Claim 2</u>

Claim 2 depends from claim 1 and incorporates its limitations. The limitations

of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 2 therefore also cannot be taught by the combination of references.

Claim 2 further recites in part:

"the detector subelements each have a width of about 1 blur diameter."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 8 of the Office Action), it is argued "subelements each have a width of about 1 blur diameter", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

<u>Claim 3</u>

Claim 3 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 3 therefore also cannot be taught by the combination of references.

Claim 3 further recites in part:

"n lies in a range of from about (3m-2) to about (3m+2), and m lies in a range of from about $(n_o/2-1)$ to about $(n_o/2+1)$."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 8 of the Office Action), it is argued "n lies in a range of from about (3m - 2) to about (3m + 2), and m lies in a range of from about (n_o/2 - 1) to from (n_o/2 + 1)", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

Claim 4

Claim 4 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 4 therefore also cannot be taught by the combination of references.

Claim 4 further recites in part:

> "n lies in a range from (3m-2) to (3m+2), and m lies in a range of from (n_o/2-1) to (n_o/2+1)."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the

optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 8 of the Office Action), it is argued "n lies in a range of from (3m - 2) to (3m + 2), and m lies in a range of from (n_o/2 - 1) to (n_o/2 + 1)", referencing Figure 1 of Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

Claim 5

Claim 5 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the references for the reasons stated above and which are incorporated here. Claim 1 is not taught by the combination of references, and claim 5 therefore also cannot be taught by the combination of references.

Claim 5 further recites in part:

"n is equal to 3m and m is equal to n_O/2."

There is no teaching in either reference of this limitation. As pointed out above, the attempt to analogize the "scanning spot" of Hou with the "blur circle" of the present claims is baseless and is not supported by anything in Hou. In fact, Hou's discussion of its application in flatbed scanners makes it clear that Hou is talking about a scanning spot that travels over the document, not the broadening of a point in the scene by the optics of the imaging system.

But even if such an analogy were made, none of the references has any teaching of the quoted claim limitation.

In the explanation of the rejection (first full paragraph on page 8 of the Office Action), it is argued "n is equal to 3m and m is equal to n_O/2", referencing Figure 1 of

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Carnall. Figure 1 is a side view of a sensor array, and no feature that could arguably be indicated as a "blur diameter" is even shown. Carnall also has no teaching of such a limitation in its specification text.

SUMMARY AND CONCLUSION

The present approach claims two distinct types of innovations. First, the designing of the detector subelements responsive to the blur-circle image; second, the cooperatively analysis of the output signals from at least two spatially adjacent array subelements to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and reaching conclusions based upon that data set.

The references do not deal at all with these subjects.

Applicant asks that the Board reverse the rejections.

Respectfully submitted,

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APPENDIX I

Copy of Claims Involved in the Appeal

1. An imaging sensor system comprising

an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter; and

a detector array at the image plane,

wherein the detector array is a one-dimensional detector array comprising a plurality of detector subelements each having a width of from about 1/2 to about 5 blur diameters, and a length of n blur diameters,

wherein each detector subelement overlaps each of two adjacent detector subelements along their lengths,

wherein an overlap of each of the two adjacent detector subelements is m blur diameters and a center-to-center spacing of each of the two adjacent detector subelements is n_o blur diameters, and

wherein n is equal to about 3m and m is equal to about $n_o/2$.

2. The imaging sensor system of claim 1, wherein the detector subelements each have a width of about 1 blur diameter.

3. The imaging sensor system of claim 1, wherein n lies in a range of from about (3m-2) to about (3m+2), and m lies in a range of from about ($n_o/2-1$) to about ($n_o/2+1$).

4. The imaging sensor system of claim 1, wherein n lies in a range from (3m-2) to (3m+2), and m lies in a range of from ($n_o/2-1$) to ($n_o/2+1$).

5. The imaging sensor system of claim 1, wherein n is equal to 3m and m is equal to $n_o/2$.

6. The imaging sensor system of claim 1, wherein the length of the detector subelements is at least 20 times the detector width, and wherein n is substantially equal to 3m and m is substantially equal to $n_0/2$.

7. The imaging sensor system of claim 1, wherein n is substantially equal to (3m-2) and m is substantially equal to ($n_0/2-1$).

8. The imaging sensor system of claim 1, wherein the length of the detector subelements is less than 20 times the detector width, and wherein n is substantially equal to (3m-2) and m is substantially equal to ($n_0/2-1$).

9. The imaging sensor system of claim 1, wherein n is substantially equal to (3m+2) and m is substantially equal to ($n_0/2+1$).

10. The imaging sensor system of claim 1, wherein the length of the detector subelements is less than 20 times the detector width, and wherein n is substantially equal to (3m+2) and m is substantially equal to ($n_0/2+1$).

11. The imaging sensor system of claim 1, further including

a scanning mechanism that scans the one-dimensional detector array in a scanning direction perpendicular to the length of the detector subelements.

12. The imaging sensor system of claim 1, further including

a moving platform upon which the one-dimensional detector array is mounted.

13. An imaging sensor system comprising

an optics system that images a point feature of a scene at an image plane as a blur-circle image having a blur diameter; and

a detector array at the image plane,

wherein the detector array is a one-dimensional detector array or a two-dimensional detector array comprising a plurality of detector subelements, and

wherein the detector subelements are sized responsive to the blur diameter.

14. The imaging sensor system of claim 13, wherein the detector subelements arc square in plan view.

15. The imaging sensor system of claim 13, wherein the detector subelements are rectangular in plan view.

16. The imaging sensor system of claim 15, wherein the detector array is a two-dimensional detector array, and wherein each detector subelement is rectangular in plan view with a length of n blur diameters, a lengthwise overlap of 1 blur diameter relative to a laterally adjacent detector subelement, and a staggered pattern of detector subelements that repeats every m laterally adjacent rows, where m is a positive integer.

17. A method for locating a position of a feature in a scene, comprising the steps of

forming an image of the feature using a segmented array having a plurality of array subelements, wherein each of the array subelements has an output signal; and

cooperatively analyzing the output signals from at least two spatially adjacent array subelements

to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and

to reach a conclusion from the data set as to a location of the image of the feature on the segmented array.

18. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a one-dimensional segmented array having spatially overlapping array subelements.

19. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a two-dimensional segmented array formed of a pattern of intersecting array subelements.

20. The method of claim 17, wherein the step of providing a sensor includes the step of

providing a two-dimensional segmented array formed of a pattern of square array subelements, wherein four of the square array subelements meet at an intersection point, and wherein the step of forming an image includes the step of

forming the image having a diameter of one blur diameter.

21. The imaging sensor system of claim 13, wherein each detector subelement overlaps each of two adjacent detector subelements along their lengths by an amount that is responsive to the blur diameter.

APPENDIX II

Evidence Entered and Relied Upon in the Appeal

None

APPENDIX III

Related Proceedings

None